Center Innovation Fund: SSC CIF

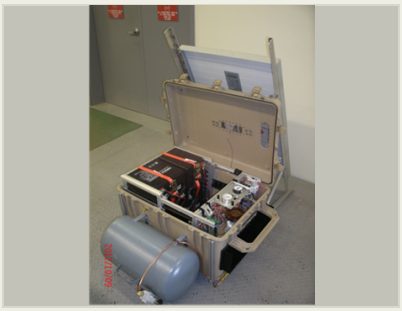
Self-Contained Portable Data Acquisition/Control System Unit for Hydrogen Environments

Completed Technology Project (2011 - 2014)

Project Introduction

The platform is designed to be a self-contained unit that is built to support a wide variety of electrical equipment, and constructed so that it can be safely deployed within hydrogen environments. The unit takes advantage of recent advancements in computer technologies, and incorporates them for utilization throughout ground propulsion test facilities, eliminating the need for rebuilding existing systems. The unit is a practical field deployable tool that can be setup quickly throughout the facilities' hydrogen environments, and offers the capability for rapid deployment for instances when issues suddenly arise and facility Data Acquisition Control Systems (DACS) are not available. Additionally, the unit can independently operate equipment in the field for an extended duration (approximately 30 days). The unit provides three major innovations: (1) the ability to effectively power, cool and purge electrical equipment in a self-contained intrinsically safe enclosure; (2) mobile equipment cooling capability for extended operational durations; and (3) employs a novel intrinsically safe instrumentation interconnection port.

An independent equipment platform designed to support a wide variety of electrical equipment was encapsulated into a self-contained portable enclosure unit. The unit was constructed for certified deployment within "Class I, Division 2, Group B" explosive environments). The units employ a novel purging system with redundant tanks for ensuring external gases remain isolated from the unit's internal components. The interior is continually monitored for a loss of positive purge pressure. Upon any loss of purge events, the system will immediately go into a safe state. The units employ highly efficient coolers for actively removing interior heat through an external convection driven thermal heat exchanger. The cooling system is highly effective for maintaining proper electronic operating temperatures while remaining safe for use within explosive environments. A heavy duty but light weight case with roller and retractable handle features was modified to make portable air sealed enclosures for encapsulating the units. The cases were equipped with external solar panel mounting rails, a viewing window, enhanced door seals, low pressure relief valves, and intrinsically safe wire ports which are custom made, and allow instrumentation, control, and network access interconnections to be hermetically sealed. The portable systems are easily setup for quick deployment for independent operation in hydrogen environments. The units may be left operational for up to thirty days with the existing battery. The system is automatically controlled by a custom built microprocessor control module. The intelligent module links all the systems for performing real-time synchronized operations with a simple user interface panel. The panel can be observed through a viewing window, and operated with magnetic scroll/enter switches. The microprocessor module also provides basic operational event logging and basic cargo interface capabilities.



SCoPE Unit

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Stennis Space Center (SSC)

Responsible Program:

Center Innovation Fund: SSC CIF

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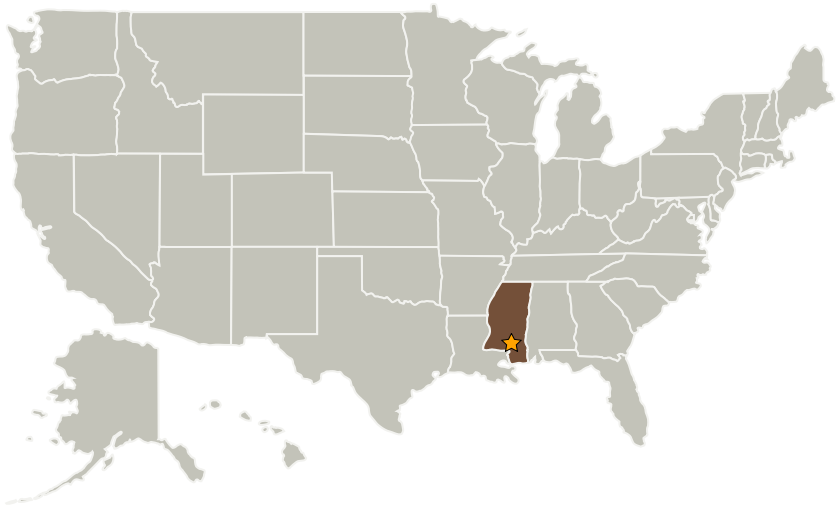
Anticipated Benefits

The unit will directly benefit NASA funded mission by facilitating the reduction of schedule and cost of activities conducted within hydrogen environments associated with supporting small development efforts such as anomaly investigations and technology demonstrations. The unit will also help alleviate the build-up and demolition of temporary systems that have historically been used in hydrogen environments for this purpose. The unit can be rapidly deployed to economically support these projects, and will help improve anomaly investigations in remote locations.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Stennis Space Center(SSC)	Lead Organization	NASA Center	Stennis Space Center, Mississippi

Primary U.S. Work Locations
Mississippi

Project Management

Program Director:
Michael R Lapointe

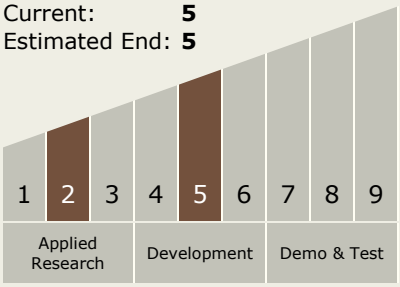
Program Manager:
Ramona E Travis

Project Manager:
Scott L Jensen

Principal Investigator:
Scott L Jensen

Technology Maturity (TRL)

Start: **2**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
  - TX13.1 Infrastructure Optimization
    - TX13.1.4 Propellant Production, Storage and Transfer

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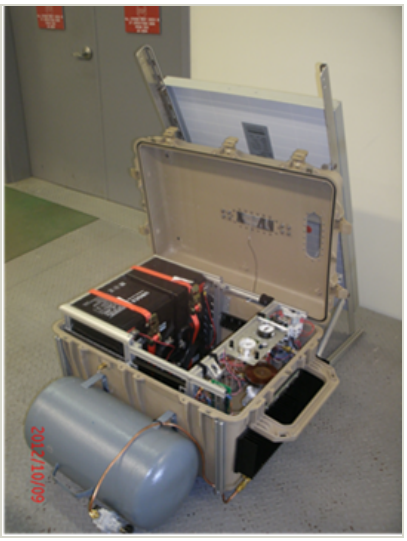
Images



SCoPE Unit
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(https://techport.nasa.gov/image/2749)